

Claims

1. An image display device which comprises an image display panel, in which image display media are sealed in cells formed in an isolated manner from one another by partition walls between the
5 opposed substrates, at least one of two substrates being transparent, and, in which the image display media, to which an electrostatic field is applied, are made to move so as to display an image, characterized in that a plurality of cells are arranged in such a manner that they do not correspond one for one to the positions of pixels for displaying the
10 image.
2. An image display device which comprises an image display panel, in which image display media are sealed in cells formed in an isolated manner from one another by partition walls between the opposed substrates, at least one of two substrates being transparent,
15 and, in which the image display media, to which an electrostatic field is applied, are made to move so as to display an image, characterized in that a ratio of cell area/pixel area is formed to be smaller than 4.
3. The image display device according to claim 1 or 2, wherein
a shape of the cell formed by the partition walls is a square shape, a
20 triangular shape, a hexagonal shape, a circular shape or an oval shape.
4. The image display device according to one of claims 1 - 3, wherein an arrangement of the cell is a honeycomb structure.
5. The image display device according to one of claims 1 - 4, wherein a shape of the cell formed by the partition walls is a
25 hexagonal shape and an arrangement of the cell is a honeycomb structure.
6. The image display device according to one of claims 1 - 5, wherein the image display media are particles or liquid powders.
7. A method of manufacturing an image display panel having
30 such a construction that image display media such as gas, liquid, solid, particles, liquid powders and so on are sealed in cells formed in an isolated manner from one another by partition walls between two opposed substrates, at least one of two substrates being transparent,

characterized in that the improvement comprises the steps of: forming a first layer made of photosensitive color composite on one substrate; forming a second layer made of photosensitive composite, which has a light transmission higher than that of the first layer and a thickness
5 larger than that of the first layer, on the first layer; performing an exposure through a mask with respect to the first layer and the second layer on the substrate; performing a developing and a washing with respect to the exposed first and second layers so as to form color partition walls on the substrate; and connecting the other substrate to
10 the color partition walls.

8. The method of manufacturing the image display panel according to claim 6, wherein a light transmission of the photo-sensitive color composite forming the first layer in a wavelength band of visible light (380 nm - 780 nm) is not larger than 20%, and a light
15 transmission of the photosensitive composite forming the second layer in a wavelength band of 300 nm - 450 nm is not less than 20%.

9. The method of manufacturing the image display panel according to claim 6 or 7, wherein a film made of a photosensitive composite is laminated on the first layer so as to obtain the second layer.

20 10. The method of manufacturing the image display panel according to one of claims 6 - 8, wherein a color of the first layer is black.

11. An image display panel characterized in that the improvement is manufactured according to the method of manufacturing the
25 image display panel set forth in one of claims 6 - 9.

12. An image display panel characterized in that the improvement is manufactured according to the method of manufacturing the image display panel set forth in one of claims 6 - 9, and uses particles or liquid powders as the image display media.

30 13. An image display device which comprises an image display panel, in which particles or liquid powders as image display media are sealed in cells formed in an isolated manner from one another by partition walls between two opposed substrates, at least one of two

substrates being transparent, and, in which the particles or the liquid powders, to which an electrostatic field is applied, are made to move so as to display an image, characterized in that the partition walls are manufactured by a photolithography method, and a shape of the
5 partition wall is a taper shape such that a width of an end portion at a side of a rear substrate is larger than that at a side of a front substrate.

14. The image display device according to claim 12, wherein the partition walls are manufactured by means of the photolithography method by: applying a photosensitive material including a thermosetting resin on the substrate; performing an exposure only for a portion of the applied photosensitive material corresponding to the partition walls by using a photo mask; hardening the photosensitive material; and removing non-hardening portions by developing; so that the partition walls having a reverse taper shape, such that the width of the end
10 portion at a side of the rear substrate is larger than that at a side of the front substrate, are formed.
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15. The image display device according to claim 13, wherein, in the case of manufacturing the partition wall having the reverse taper shape, a light is intentionally diffused by performing a proximity exposure, in which a gap is formed between the photo mask and the
20 photosensitive material, so that the reverse taper shape is formed.

16. The image display device according to claim 13, wherein, in the case of manufacturing the partition wall having the reverse taper shape, an exposure is performed at a low amount of light exposure so as to react only a surface layer of the hardening agent, so that the
25 reverse taper shape is formed.

17. The image display device according to one of claims 12 - 15, wherein a ratio w_1/w_2 between an end width w_2 at a side of the rear substrate and an end width w_1 at a side of the front substrate is not
30 larger than 0.5.

18. The image display device according to one of claims 12 - 16, wherein a color of the particles or the liquid powders used for the image display media is white or black.

19. The image display according to one of claims 12 - 17,
wherein the partition wall positioned between the opposed substrates
has a cantilever rib structure.

20. The image display device according to one of claims 12 - 18,
5 wherein a particle size distribution Span of inorganic powders
included in the partition wall material, which is defined by the
following formula, is less than 8:

$$\text{Span} = (d(0.9) - d(0.1))/d(0.5) ;$$

(here, $d(0.5)$ means a value of the particle size expressed by μm
10 wherein an amount of the particles having the particle size larger than
or smaller than this value is 50%, $d(0.1)$ means a value of the particle
size expressed by μm wherein an amount of the particles having the
particle size smaller than this value is 10%, and $d(0.9)$ means a value
of the particle size expressed by μm wherein an amount of the
15 particles having the particle size smaller than this value is 90%).

21. The image display device according to one of claims 12 - 19,
wherein an average particle diameter of the inorganic powders is 0.1 -
20 μm .

22. The image display device according to one of claims 12 - 10,
20 wherein a gap between the opposed substrates is filled with a gas
having a relative humidity of not larger than 60% RH at 25°.